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Understanding Banks' Earnings:
An Evaluation and Forecasting Technique

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The year-to-year change in a bank's earnings per share (EPS) is driven by the fluctuating values of nine critical ratios. This paper defines those ratios and shows how to integrate them into a spreadsheet routine that will:

- isolate their respective dollar-and-cents contributions to annual changes in EPS,
- measure their relative power to improve EPS, and
- calculate future EPS based on their projected values.

This analytical technique is useful to both investors and managers. It quantifies for investors the effect on EPS of past ratio changes, and it helps them evaluate the bank's capacity for future earnings increases. It reveals to managers those operational areas where improvements will yield the greatest bottom line benefits, and it allows them to calculate the EPS effect of targeted ratio changes.

I. Nine Critical Ratios

Definitions

A bank's EPS is determined by the interaction of nine critical ratios, which we define in the following way.

RATIO 1: INTEREST EXPENSE ÷ AVERAGE LIABILITIES
—the average interest rate paid on total average liabilities.
RATIO 2: PROVISION FOR LOAN LOSSES ÷ INTEREST INCOME
—the loan loss provision rate.
RATIO 3: INTEREST INCOME ÷ TOTAL REVENUE
—the percent of revenue derived from interest income.
RATIO 4: NON-INTEREST EXPENSE ÷ TOTAL REVENUE LESS INTEREST EXPENSE
—commonly known as the efficiency ratio. A bank with significant tax exempt interest income will sometimes increase the ratio's denominator, *total revenue less interest expense*, adding to it the tax benefit that results from exempt interest income. This adjustment produces a lower—and, at first glance, better—efficiency ratio than the one calculated by the standard method. We will avoid this needless complication. Any tax benefit arising from exempt income will be readily apparent in the below-normal tax rate calculated by the next ratio.
RATIO 5: INCOME TAX ÷ PRETAX EARNINGS
—the effective tax rate.
RATIO 6: TOTAL REVENUE ÷ AVERAGE ASSETS
—the rate of asset turnover.
RATIO 7: AVERAGE COMMON EQUITY ÷ AVERAGE ASSETS
—the common equity ratio. Changes in the common equity ratio will always be examined in conjunction with changes in the preferred equity ratio (average preferred equity ÷ average assets).

RATIO 8: PREFERRED CHARGES ÷ AVERAGE COMMON EQUITY
—the reduction in return on common equity arising from the payment of preferred dividends and preferred stock retirement premiums.
Ratio 9: average common equity ÷ average common shares outstanding
—the book value.

The Effect of Critical Ratio Value Changes on EPS

We shall now see how the values of these ratios shaped the EPS change of a $66 billion dollar bank holding company headquartered in the Midwest. The bank's annual report shows that earnings for the latest fiscal year were thirty-one cents per share higher than earnings for the previous fiscal year.

Using the procedure explained below, we can trace those thirty-one cents back to specific increases and decreases in the year-to-year values of the nine critical ratios. As Exhibit 1, Column D shows:

RATIO 1. The average interest rate paid on total liabilities increased, costing about 27 cents per share.

RATIO 2. The loan loss provision rate increased, costing about 15 cents per share.

RATIO 3. The percent of interest revenue to total revenue increased, costing about one cent per share. (This is a roundabout way of saying that there was a decrease in the percent of non-interest revenue to total revenue. For mathematical simplicity, we use the percent of interest revenue rather than non-interest revenue.)

RATIO 4. The efficiency ratio decreased, adding about 31 cents per share.

RATIO 5. The tax rate increased, costing about 2 cents per share.

RATIO 6. The asset turnover increased, adding about 15 cents per share.

RATIO 7. The common equity ratio decreased (partially offset by an increase in the preferred equity ratio), adding about 12 cents per share.

RATIO 8. The preferred charge to common equity increased, costing about 2 cents per share.

RATIO 9. The book value increased, adding about 20 cents per share.

When the positive and negative effects of these ratio changes are summed, the result is $0.31. Adding this amount to the Previous Year's EPS of $2.45, we arrive at the Latest Year's EPS of $2.76. Let's find out how the figures were derived.

Exhibit 1—EPS Effect of Year-to-year Changes in Critical Ratios

	Column A	Column B		Column C		Column D
	Critical Ratio	$ Effect of Changing One Ratio at a Time	x	Coefficient of Ratio Interaction	=	$ Effect of Changing All Ratios at Once
1	Interest Rate	-$0.29022	x	93.700%	=	-$0.27194
2	Loan Loss Provision Rate	-$0.16175	x	93.700%	=	-$0.15156
3	Interest Revenue/Total Revenue	-$0.01249	x	93.700%	=	-$0.01170
4	Efficiency Ratio	$0.33500	x	93.700%	=	$0.31390
5	Tax Rate	-$0.02265	x	93.700%	=	-$0.02122
6	Asset Turnover	$0.16057	x	93.700%	=	$0.15045
7	Equity Ratio (Preferred + Common)	$0.12615	x	93.700%	=	$0.11820
8	Preferred Charge to Common Equity	-$0.02585	x	93.700%	=	-$0.02422
9	Book Value	$0.21793	x	93.700%	=	$0.20420
10	Sum of All $ Effects	$0.32669				$0.30611
11	Previous Year's EPS	+ $2.45198			+	$2.45198
12	Latest Year's EPS: derived	= $2.77867			=	$2.75809
13	Latest Year's EPS: actual	– $2.75809			–	$2.75809
14	$ over(under)-statement of EPS	= $0.02058			=	$0.00000

15 Coefficient of Ratio Interaction: 93.700%
   = actual $ change in EPS ÷ derived $ change in EPS
   =   [B13 – B11]   ÷   B10

II. Determining the Effect of Ratio Changes on EPS

Deriving Annual EPS from the Critical Ratios

This section describes the fundamental EPS equation, shows how the critical ratios are integrated into it, and traces those ratios back to the bank's annual report.

The EPS equation. A bank's annual EPS can be calculated using the equation shown in Exhibit 2. The equation is set up as a spreadsheet of fifteen cells. The cells are organized into six groups: each group is indicated by a vertical line that borders its cells; the last cell of one group is also the first cell of the next.

Operating margin. The first group (cells 1 through 5) calculates the operating margin (18.766%). It does this by setting total revenue equal to 100% and subtracting from it the percentages of revenue consumed by the interest expense (32.285%), the provision for loan losses (4.120%), and the non-interest expense (44.829%).

Profit margin. The second group (cells 5 through 7) calculates the profit margin (12.609%) by subtracting the percent of total revenue consumed by taxes (6.157%) from the operating margin (18.766%).

Return on assets. The third group (cells 7 through 9) calculates the return on average assets (1.443%) by multiplying the profit margin (12.609%) times the asset turnover (11.444%).

Return on common equity. The fourth group (cells 9 through 11) calculates the return on average common equity (22.299%) by dividing the return on assets (1.443%) by the common equity ratio (6.471%).

Return on common equity after preferred charge. The fifth group (cells 11 through 13) calculates the net return on average common equity (21.338%) by subtracting from the return on common equity (22.299%) the preferred charge to common equity (0.961%).

Earnings per share. And the sixth group (cells 13 through 15) calculates the earnings per share of common stock ($2.76) by multiplying the net return on common equity (21.338%) times the book value ($12.93).

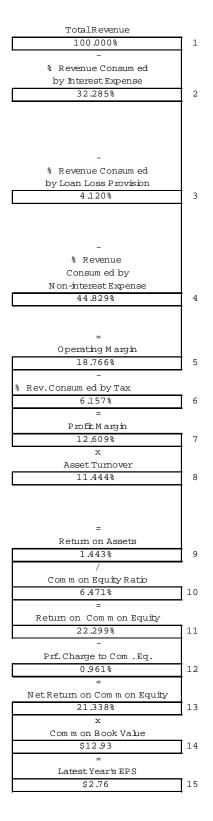|	
TotalRevenue	
100.000%	1
–	
% Revenue Consumed by Interest Expense	
32.285%	2
–	
% Revenue Consumed by Loan Loss Provision	
4.120%	3
–	
% Revenue Consumed by Non-interest Expense	
44.829%	4
=	
Operating Margin	
18.766%	5
–	
% Rev. Consumed by Tax	
6.157%	6
=	
Profit Margin	
12.609%	7
x	
Asset Turnover	
11.444%	8
=	
Return on Assets	
1.443%	9
/	
Common Equity Ratio	
6.471%	10
=	
Return on Common Equity	
22.299%	11
–	
Prf. Charge to Com. Eq.	
0.961%	12
=	
Net Return on Common Equity	
21.338%	13
x	
Common Book Value	
$12.93	14
=	
Latest Year's EPS	
$2.76	15

Exhibit 2—EPS Equation

Integrating the nine critical ratios into the EPS equation. Exhibit 3 adds a new column to the left of the EPS equation. Included among the twelve cells of the new column are the nine critical ratios, shown as white cells with double-lined borders. Where necessary, the new column mathematically converts certain of these ratios into a form that allows them to flow into the EPS equation (right column), as explained below. The equation then calculates the dollar effect of the critical ratios' combined values.

Banking industry expense ratios. In order to calculate the operating margin in the EPS equation (right column, cell 5) it is necessary to express the interest expense, the loan loss provision expense, and the non-interest expense as percentages of total revenue. However, the banking industry finds it useful to express these expenses as percentages of other things.

In Exhibit 3's left column we re-express these same expenses in a banking industry format. Interest expense is presented as the ratio of interest expense to average liabilities; the provision for loan losses is presented as the ratio of the loan loss provision to interest income; and non-interest expense is presented as the efficiency ratio (i.e., the ratio of non-interest expense to total revenue less interest expense).

Despite their usefulness to bankers, these industry expense ratios are mathematically troublesome. Because each has a different denominator, they won't work together in the EPS equation unless we can find some way to standardize them.

Standardizing the expense ratios. In Exhibit 3's left column you will find the average interest rate, the loan loss provision rate, and the efficiency ratio in cells 1, 3, and 5, respectively. Each of these is associated with a particular "compensating ratio," which appears in the cell directly below it. When the two associated ratios are multiplied together, the troublesome denominator is eliminated and the expense is converted into a percentage of total revenue—making it usable in the EPS equation.

Compensating ratios. The compensating ratios needed to pull off this little mathematical trick are themselves interesting. Cell 2 is the number of years of revenue needed to cover the bank's liabilities. Cell 4 is the percent of total revenue that comes from interest income (and is itself one of the critical ratios). And cell 6 is the percent of total revenue left over after interest expense is paid. Notice that cells 2 and 6 are darkened. Their values are dependent on the values of other critical ratios. We'll say more about these two cells later.

Tax rate. The tax rate of 32.809% appears in cell 7. When the tax rate is multiplied times the operating margin of 18.766% (right column, cell 5), the result is the percent of total revenue consumed by tax, 6.157% (right column, cell 6).

Preferred equity ratio. The preferred equity ratio (left column, cell 9—note the dotted border) is not used at this point, but will be needed later when we determine the effect of each ratio's year-to-year change on EPS

Other ratios. The other ratios—asset turnover, common equity ratio, preferred charge to common equity, and book value—require no adjustment and flow directly into the EPS equation.

Exhibit 3—Critical Ratios and Compensating Ratios

Values of Critical Ratios	EPS Calculation	
	Total Revenue	
	100.000%	1
Avg. Interest Rate	–	
1 3.973%	% Revenue Consumed by Interest Expense	
x		
Yrs. of Revenue to Cover Liabilities	= 32.285%	2
2 8.12616		
Loan Loss Provision Rate	–	
3 5.464%	% Revenue Consumed by Loan Loss Provision	
x		
% Revenue from Interest	= 4.120%	3
4 75.403%		
Efficiency Ratio	–	
5 66.204%	% Revenue Consumed by Non-interest Expense	
x		
% Revenue After Interest Expense	= 44.829%	4
6 67.714%		
	=	
	Operating Margin	
	18.766%	5
Tax Rate	–	
	% Rev. Consumed by Tax	
7 32.809%	> 6.157%	6
	=	
	Profit Margin	
	12.609%	7
Asset Turnover	x	
	Asset Turnover	
8 11.444%	= 11.444%	8
Preferred Equity Ratio		
9 0.530%	=	
	Return on Assets	
	1.443%	9
Common Equity Ratio	/	
	Common Equity Ratio	
10 6.471%	= 6.471%	10
	=	
	Return on Common Equity	
	22.299%	11
Prf. Charge to Com. Eq.	–	
	Prf. Charge to Com. Eq.	
11 0.961%	= 0.961%	12
	=	
	Net Return on Common Equity	
	21.338%	13
Common Book Value	x	
	Common Book Value	
12 $12.92515	= $12.92515	14
	=	
	Latest Year's EPS	
	$2.75809	15

Determining the critical ratios' values. Exhibit 4 introduces two more columns. The first, Column A, contains selected annual report figures from the latest fiscal year; the second, Column B, identifies the figures and groups them into ratios. All the values discussed above are derived from these figures. Because of rounding, a few values in Exhibits 2 and 3 differ slightly from their counterparts in Exhibit 4, Columns D and E. (Exhibit 5 is set up exactly like Exhibit 4, but gives figures for the previous fiscal year.)

In Column A, eight of the figures are found in the *Income Statement*: interest income, total revenue (i.e., the sum of interest income and non-interest income), interest expense, provision for loan loss, non-interest expense, pretax income, income taxes, and average number of common shares outstanding. Four others are found in the *Average Balance and Net Interest Analysis*: average assets, average liabilities, average preferred equity, and average common equity. And one is found in the *Statement of Shareholders' Equity*: preferred dividends paid.

Deducing average preferred equity and average common equity. Sometimes a bank that has issued both preferred and common stocks will not specify their respective dollar amounts in its average balance sheet, but will only report their combined dollar value as "total equity." In that case, you must deduce their dollar amounts. Somewhere in its annual report the bank will state its return on average common equity. Dividing this percentage into its net income before preferred dividends will give the dollar amount of its average common equity. And subtracting that amount from the average total equity will give the dollar amount of average preferred equity.

Adjusting for large unrealized securities gains. A bank with an unusually high unrealized gain on investment securities may use asset and equity amounts different from those given in the average balance sheet when it computes asset turnover, return on average assets, common equity ratio, return on average common equity, book value, and EPS. In such cases adjust the average balance sheet's asset, equity, and liability amounts as follows and use the adjusted amounts in your calculations.

> ADJUSTED AVERAGE TOTAL ASSETS: Use average total assets less the gross unrealized gain on investment securities.
> ADJUSTED AVERAGE COMMON EQUITY: Use average realized common equity (which should be given as a component of average equity).
> ADJUSTED AVERAGE LIABILITIES: First, subtract the average balance sheet's net unrealized gain on investment securities from its gross unrealized gain on investment securities. (The difference is the part of "other liabilities" attributable to unrealized gains on investment securities.) Then, subtract this difference from the average balance sheet's total liabilities. Use the result for average total liabilities.
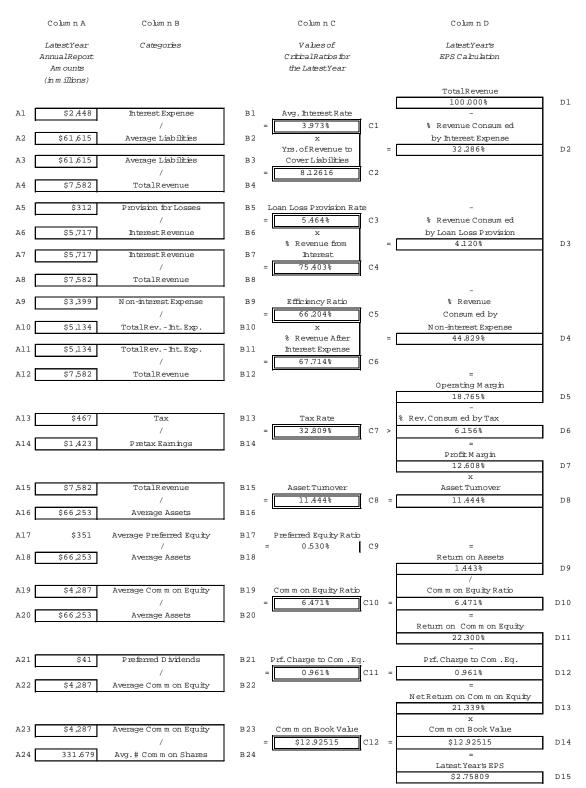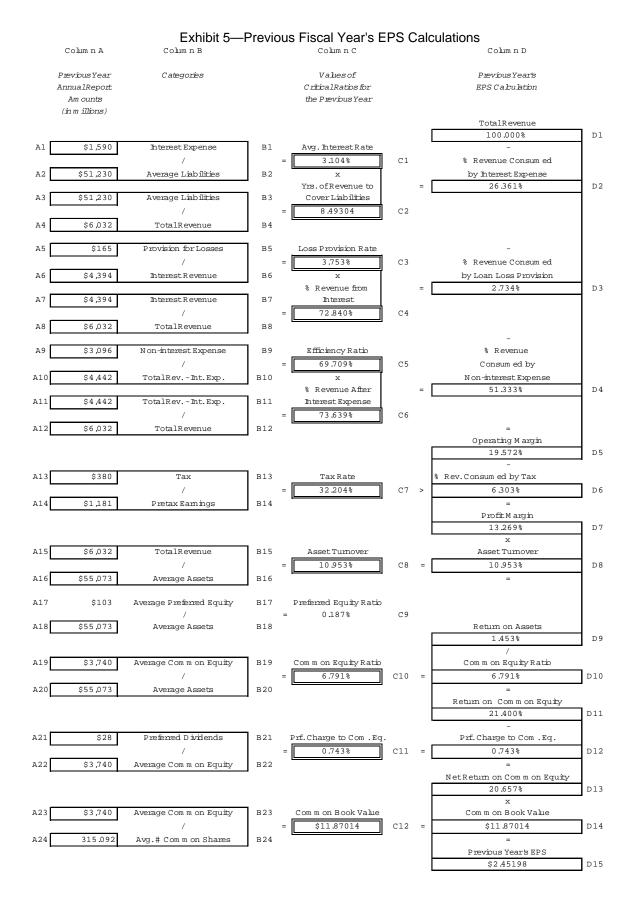
Exhibit 4—Latest Fiscal Year's EPS Calculations

Column A	Column B	Column C	Column D
Latest Year Annual Report Amounts (in millions)	*Categories*	*Values of Critical Ratios for the Latest Year*	*Latest Year's EPS Calculation*

				Total Revenue		
				100.000%		D1
A1	$2,448	Interest Expense	B1	Avg. Interest Rate		–
A2	$61,615	Average Liabilities	B2	= 3.973% C1	% Revenue Consumed by Interest Expense	
A3	$61,615	Average Liabilities	B3	x	32.286%	D2
A4	$7,582	Total Revenue	B4	Yrs. of Revenue to Cover Liabilities	=	
				= 8.12616 C2		
A5	$312	Provision for Losses	B5	Loan Loss Provision Rate	–	
A6	$5,717	Interest Revenue	B6	= 5.464% C3	% Revenue Consumed by Loan Loss Provision	
A7	$5,717	Interest Revenue	B7	x	4.120%	D3
A8	$7,582	Total Revenue	B8	% Revenue from Interest	=	
				= 75.403% C4		
A9	$3,399	Non-interest Expense	B9	Efficiency Ratio	–	
A10	$5,134	Total Rev. – Int. Exp.	B10	= 66.204% C5	% Revenue Consumed by Non-interest Expense	
A11	$5,134	Total Rev. – Int. Exp.	B11	x	44.829%	D4
A12	$7,582	Total Revenue	B12	% Revenue After Interest Expense	=	
				= 67.714% C6		
					=	
				Operating Margin		
				18.765%		D5
A13	$467	Tax	B13	Tax Rate	–	
A14	$1,423	Pretax Earnings	B14	= 32.809% C7 >	% Rev. Consumed by Tax	
					6.156%	D6
					=	
				Profit Margin		
				12.608%		D7
				x		
A15	$7,582	Total Revenue	B15	Asset Turnover	Asset Turnover	
A16	$66,253	Average Assets	B16	= 11.444% C8	= 11.444%	D8
A17	$351	Average Preferred Equity	B17	Preferred Equity Ratio		
A18	$66,253	Average Assets	B18	= 0.530% C9	=	
					Return on Assets	
					1.443%	D9
					/	
A19	$4,287	Average Common Equity	B19	Common Equity Ratio	Common Equity Ratio	
A20	$66,253	Average Assets	B20	= 6.471% C10	= 6.471%	D10
					=	
					Return on Common Equity	
					22.300%	D11
A21	$41	Preferred Dividends	B21	Prf. Charge to Com. Eq.	–	
A22	$4,287	Average Common Equity	B22	= 0.961% C11	Prf. Charge to Com. Eq.	
					= 0.961%	D12
					=	
					Net Return on Common Equity	
					21.339%	D13
A23	$4,287	Average Common Equity	B23	Common Book Value	x	
A24	331.679	Avg. # Common Shares	B24	= $12.92515 C12	Common Book Value	
					= $12.92515	D14
					=	
					Latest Year's EPS	
					$2.75809	D15

Exhibit 5—Previous Fiscal Year's EPS Calculations

Column A	Column B	Column C	Column D
Previous Year Annual Report Amounts (in millions)	*Categories*	*Values of Critical Ratios for the Previous Year*	*Previous Year's EPS Calculation*

					Total Revenue 100.000%	D1
A1	$1,590	Interest Expense	B1	Avg. Interest Rate	−	
		/		= 3.104% C1	% Revenue Consumed by Interest Expense	
A2	$51,230	Average Liabilities	B2	x	= 26.361%	D2
A3	$51,230	Average Liabilities	B3	Yrs. of Revenue to Cover Liabilities		
		/		= 8.49304 C2		
A4	$6,032	Total Revenue	B4			
A5	$165	Provision for Losses	B5	Loss Provision Rate	−	
		/		= 3.753% C3	% Revenue Consumed by Loan Loss Provision	
A6	$4,394	Interest Revenue	B6	x	= 2.734%	D3
A7	$4,394	Interest Revenue	B7	% Revenue from Interest		
		/		= 72.840% C4		
A8	$6,032	Total Revenue	B8			
A9	$3,096	Non-interest Expense	B9	Efficiency Ratio	−	
		/		= 69.709% C5	% Revenue Consumed by Non-interest Expense	
A10	$4,442	Total Rev. − Int. Exp.	B10	x	= 51.333%	D4
A11	$4,442	Total Rev. − Int. Exp.	B11	% Revenue After Interest Expense		
		/		= 73.639% C6		
A12	$6,032	Total Revenue	B12			
					Operating Margin 19.572%	D5
A13	$380	Tax	B13	Tax Rate	− % Rev. Consumed by Tax	
		/		= 32.204% C7 >	6.303%	D6
A14	$1,181	Pretax Earnings	B14		= Profit Margin	
					13.269%	D7
					x	
A15	$6,032	Total Revenue	B15	Asset Turnover	Asset Turnover	
		/		= 10.953% C8	= 10.953%	D8
A16	$55,073	Average Assets	B16		=	
A17	$103	Average Preferred Equity	B17	Preferred Equity Ratio		
		/		= 0.187% C9		
A18	$55,073	Average Assets	B18		Return on Assets 1.453%	D9
A19	$3,740	Average Common Equity	B19	Common Equity Ratio	/ Common Equity Ratio	
		/		= 6.791% C10 =	6.791%	D10
A20	$55,073	Average Assets	B20		= Return on Common Equity	
					21.400%	D11
A21	$28	Preferred Dividends	B21	Prf. Charge to Com. Eq.	− Prf. Charge to Com. Eq.	
		/		= 0.743% C11 =	0.743%	D12
A22	$3,740	Average Common Equity	B22		= Net Return on Common Equity	
					20.657%	D13
					x	
A23	$3,740	Average Common Equity	B23	Common Book Value	Common Book Value	
		/		= $11.87014 C12 =	$11.87014	D14
A24	315.092	Avg. # Common Shares	B24		= Previous Year's EPS	
					$2.45198	D15

Setting Up a Spreadsheet to Evaluate Ratio Changes

To calculate the effect on EPS of each critical ratio's year-to-year change in value, use the spreadsheet format and formulas shown in Exhibit 6. Exhibit 6 is divided into three parts. The first part corresponds to Exhibit 4 and calculates EPS for the latest fiscal year. The second part corresponds to Exhibit 5 and calculates EPS for the previous fiscal year. The third part uses information from the other two parts to isolate the EPS effect of each ratio's year-to-year change in value.

Identifying the cells. The individual cells of Exhibit 6 are designated by their column and their order within that column. The top cell of a column is number 1. Thus, in Column A the eighth cell from the top is designated A8.

Because the spatial layout of cells differs from column to column, cells that have the same number may have different vertical locations within their respective columns. For example, cell A8 is higher on the page than cell C8. This numbering system is used to simplify the instructions. Your computer spreadsheet program will number the cells differently, and you must take that into account when setting up your own spreadsheet.

Entering values in the cells. For a cell that contains a dollar sign ($), enter the appropriate dollar figure from the annual report. For a cell that contains a number sign (#), enter the average number of common shares outstanding. Set cells D1, H1, and J1 equal to 100%, which represents total revenue.

For all other cells, enter the given formulas. Be sure to correct the column-and-row designation of each cell in the given formula to reflect that cell's location on your spreadsheet.

(Although the pretax earnings figure could be derived with a formula, we enter the dollar amount in order to simplify some later tax calculations.)

Minimizing rounding errors. At times a change in a ratio's value can have an EPS effect of less than one cent a share. This can be a significant amount when total earnings are just a few cents. Calculating to five decimal places will minimize rounding errors in procedures described below.

Column I reformulations. Cells I2 and I6, have been formulated differently than their corresponding cells in Parts 1 and 2. Rather than deriving their values from dollar amounts (as before), we now derive them from other ratios. We do this because the values of I2 and I6 depend on the values of other cells that we shall be adjusting; any change in those cells should be automatically reflected in I2 and I6. Here is how the new formulations were derived.

Cell I2 corresponds to cells C2 and G2, which we have previously defined as the ratio of average liabilities to total revenue. A little algebra proves that *average liabilities ÷ total revenue* is equal to *[100% - preferred equity ratio - common equity ratio] ÷ asset turnover.* Thus, we set the value of I2 equal to *[100% - I9 - I10] ÷ I8.* One hundred percent represents total assets.

Similarly, cell I6 corresponds to cells C6 and G6, which we have previously defined as the ratio of total revenue less interest expense to total revenue. And *total revenue less interest expense ÷ total revenue* is equal to *[100% - the percent of total revenue consumed by interest expense].* Thus in Column I, we set the value of I6 equal to *[100% - J2].* Here, one hundred percent represents total revenue.

Column J. The equation in Column J differs slightly from those in Columns D and H. Cell J14 has been re-labeled *Adjusted EPS*, and two new cells have been added below it: *Previous Year's EPS* (J15) and *$ Effect of Adjustment* (J15).

Isolating Each Critical Ratio's Effect on EPS

Substituting values. We are now prepared to isolate the effect on EPS of each critical ratio's year-to-year change. In Column I substitute a Latest Year critical ratio value for a Previous Year value—one critical ratio at a time (except in the case of the common equity ratio, as explained below)—then note the effect on cell J15 ($ Effect of Adjustment).

Recall that the values for the Previous Year are in Column G, while the values for the Latest Year are in Column C. Further recall that Column I's values are currently equated with those of Column G. To make a substitution, reset a Column I cell equal to its corresponding cell in Column C.

COLUMN I. As an example, take cell I1, the average interest rate.
First, reset I1 equal to C1. (Until now, it has been equal to G1.)

After making the substitution, look at cell J16, $ Effect of Adjustment, and jot down the value appearing there.

Next, return I1 to the Previous Year value (again letting it equal G1).

Then proceed to the next critical ratio—in this case, the loan loss provision rate—and repeat the process. (Do not adjust the darkened cells I2 and I6, which are not critical ratios. Their values will automatically change when the critical ratios of which they are a function are changed.)

When you reach cells I9 and I10, the preferred and common equity ratios, treat them as a unit. Substitute the Latest Year values for both at the same time and record their combined effect. Then return both ratios to the previous year's values and continue on as before, changing one critical ratio at a time.

After recording the $ Effect on EPS of each ratio's change, add all the positive and negative changes together (as shown for our example bank in Exhibit 1, Column B, lines 1 through 10). This gives a *preliminary* earning change figure, which will be used to calculate a coefficient of ratio interactions.

Coefficient of ratio interactions. The actual year-to-year EPS change—wherein all critical ratios necessarily change at once—differs from the EPS change which results when we alter the ratios one at a time and sum the effects. For our example bank, the difference between the Latest Year's EPS of $2.75809 (B13) and the Previous Year's EPS of $2.45198 (B11) is $0.30611, while the summed effects of the one-at-a-time ratio alterations is $0.32669 (B10). Let's see why this is so.

The EPS equation is mathematically equivalent a series of four multipliers: (1) the common stock profit margin (i.e., *net profit less preferred charge* divided by *revenue*), (2) the asset turnover, (3) the reciprocal of the common equity ratio and (4) the book value. An isolated change to either the turnover ratio or the common equity ratio alters two multipliers and leaves two unchanged. An isolated change to any of the seven other critical ratios alters just one multiplier and leaves three unchanged.

Remember that in our above substitutions we changed only one critical ratio at a time, which always left two or more multipliers unaffected. But in the real world *all* the ratio values change together, and *all* the multipliers change along with them. The outcome is this: *the effect of any one multiplier's change on EPS is mediated by the effects of the other multipliers' changes—which work together to amplify its impact on EPS.*

This multiplication effect must be taken into account when we isolate the net impact of each ratio's change on EPS. To determine the net EPS effect of each ratio's change in value we use a two-step procedure:

First, we find the coefficient of ratio interaction (B15) by dividing the actual EPS change of $0.30611 (B13 minus B11) by the preliminary change of $0.32669 (B10); in this case 93.7%. (In situations where the actual change exceeds the preliminary change, the coefficient will exceed 100%.)

Then, we multiply each ratio's isolated EPS effect by the coefficient. For example, the increase in our bank's interest rate, examined in isolation, had a gross EPS effect of -$0.29022 (B1). Multiplying this amount by the coefficient 93.7% (C1) shows the net effect to be -$0.27194 per share (D1).

Multiplying the gross EPS effect of each ratio's change times the coefficient reveals the actual effect of that ratio's change on the EPS.
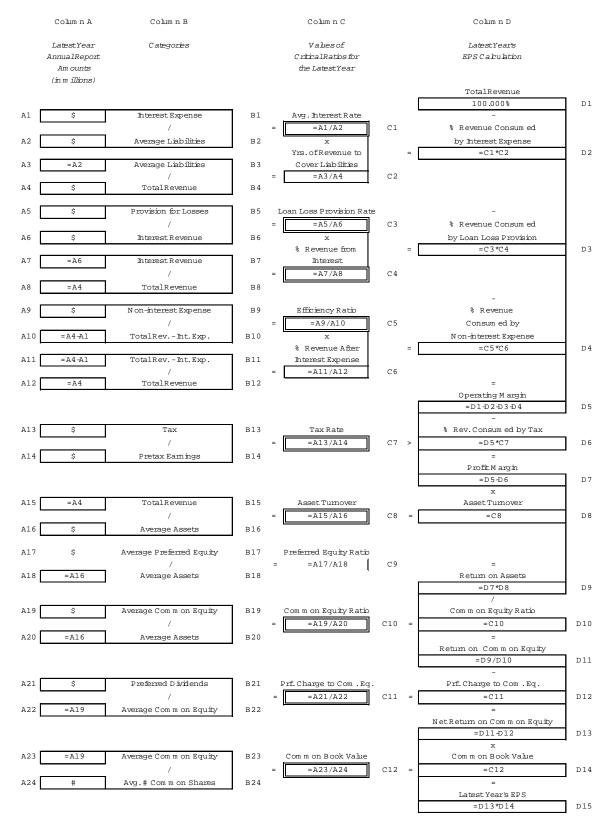
Exhibit 6—Part 1

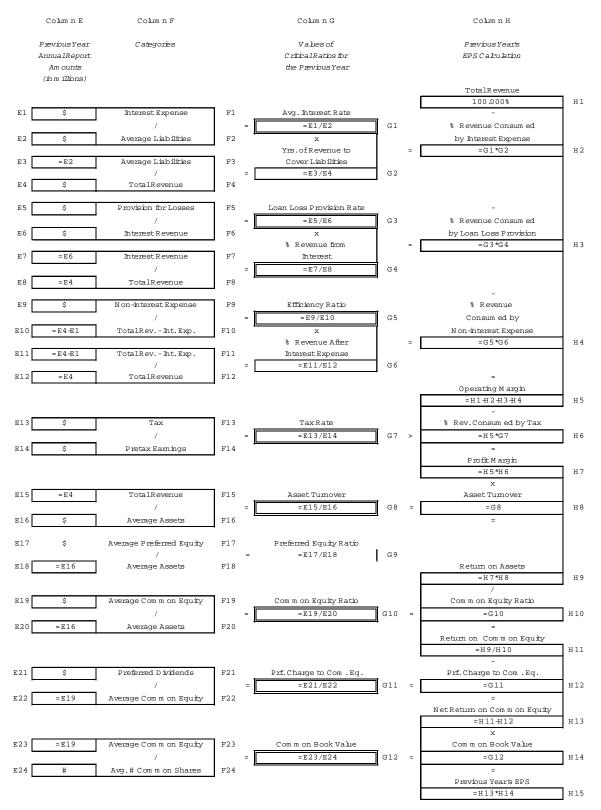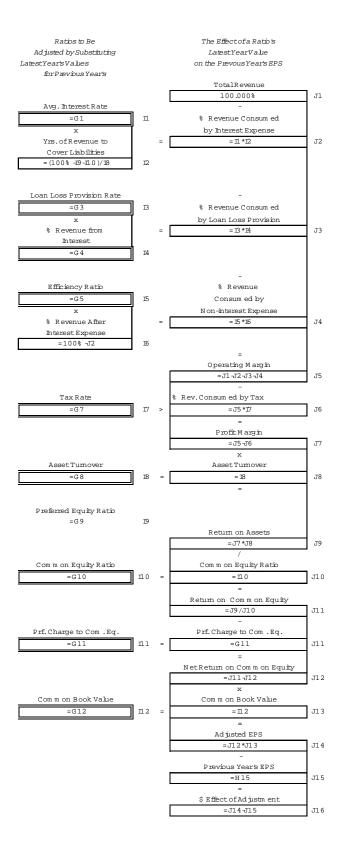| Column A	Column B	Column C	Column D
Latest Year Annual Report Amounts (in millions)	*Categories*	*Values of Critical Ratios for the Latest Year*	*Latest Year's EPS Calculation*

Total Revenue
100.000%   D1

−

A1 $ Interest Expense   B1   Avg. Interest Rate
=   =A1/A2   C1   % Revenue Consumed by Interest Expense
A2 $ Average Liabilities   B2   =   =C1*C2   D2

A3   =A2   Average Liabilities   B3   Yrs. of Revenue to Cover Liabilities
/   =   =A3/A4   C2
A4 $ Total Revenue   B4

−

A5 $ Provision for Losses   B5   Loan Loss Provision Rate
/   =   =A5/A6   C3   % Revenue Consumed by Loan Loss Provision
A6 $ Interest Revenue   B6   x   =   =C3*C4   D3

A7   =A6   Interest Revenue   B7   % Revenue from Interest
/   =   =A7/A8   C4
A8   =A4   Total Revenue   B8

−

A9 $ Non-interest Expense   B9   Efficiency Ratio
/   =   =A9/A10   C5   % Revenue Consumed by Non-interest Expense
A10   =A4−A1   Total Rev.−Int. Exp.   B10   x   =   =C5*C6   D4

A11   =A4−A1   Total Rev.−Int. Exp.   B11   % Revenue After Interest Expense
/   =   =A11/A12   C6
A12   =A4   Total Revenue   B12

=

Operating Margin
=D1−D2−D3−D4   D5

A13 $ Tax   B13   Tax Rate   % Rev. Consumed by Tax
/   =   =A13/A14   C7 >   =D5*C7   D6
A14 $ Pretax Earnings   B14

=

Profit Margin
=D5−D6   D7

x

A15   =A4   Total Revenue   B15   Asset Turnover   Asset Turnover
/   =   =A15/A16   C8   =   =C8   D8
A16 $ Average Assets   B16

A17 $ Average Preferred Equity   B17   Preferred Equity Ratio   =
/   =   =A17/A18   C9   Return on Assets
A18   =A16   Average Assets   B18   =D7*D8   D9

/

A19 $ Average Common Equity   B19   Common Equity Ratio   Common Equity Ratio
/   =   =A19/A20   C10   =   =C10   D10
A20   =A16   Average Assets   B20

=

Return on Common Equity
=D9/D10   D11

−

A21 $ Preferred Dividends   B21   Prf. Charge to Com. Eq.   Prf. Charge to Com. Eq.
/   =   =A21/A22   C11   =   =C11   D12
A22   =A19   Average Common Equity   B22

=

Net Return on Common Equity
=D11−D12   D13

x

A23   =A19   Average Common Equity   B23   Common Book Value   Common Book Value
/   =A23/A24   C12   =   =C12   D14
A24   #   Avg. # Common Shares   B24

=

Latest Year's EPS
=D13*D14   D15

Exhibit 6—Part 2

Column E | Column F | Column G | Column H

Previous Year Annual Report Amounts (in millions) | *Categories* | *Values of Critical Ratios for the Previous Year* | *Previous Year's EPS Calculation*

E1 $ Interest Expense F1	Avg. Interest Rate	= =E1/E2 G1	Total Revenue 100.000% H1
E2 $ Average Liabilities F2	x		−
E3 =E2 Average Liabilities F3	Yrs. of Revenue to Cover Liabilities		% Revenue Consumed by Interest Expense
E4 $ Total Revenue F4	= =E3/E4 G2		= =G1*G2 H2
E5 $ Provision for Losses F5	Loan Loss Provision Rate	= =E5/E6 G3	−
E6 $ Interest Revenue F6	x		% Revenue Consumed by Loan Loss Provision
E7 =E6 Interest Revenue F7	% Revenue from Interest		= =G3*G4 H3
E8 =E4 Total Revenue F8	= =E7/E8 G4		
E9 $ Non-interest Expense F9	Efficiency Ratio	= =E9/E10 G5	− % Revenue Consumed by Non-interest Expense
E10 =E4-E1 Total Rev. - Int. Exp. F10	x		
E11 =E4-E1 Total Rev. - Int. Exp. F11	% Revenue After Interest Expense		= =G5*G6 H4
E12 =E4 Total Revenue F12	= =E11/E12 G6		
			= Operating Margin =H1-H2-H3-H4 H5
E13 $ Tax F13	Tax Rate	= =E13/E14 G7	− % Rev. Consumed by Tax =H5*G7 H6
E14 $ Pretax Earnings F14			= Profit Margin =H5*H6 H7
E15 =E4 Total Revenue F15	Asset Turnover	= =E15/E16 G8	x Asset Turnover = =G8 H8
E16 $ Average Assets F16			=
E17 $ Average Preferred Equity F17	Preferred Equity Ratio	= =E17/E18 G9	Return on Assets =H7*H8 H9
E18 =E16 Average Assets F18			/
E19 $ Average Common Equity F19	Common Equity Ratio	= =E19/E20 G10	Common Equity Ratio = =G10 H10
E20 =E16 Average Assets F20			= Return on Common Equity =H9/H10 H11
E21 $ Preferred Dividends F21	Prf. Charge to Com. Eq.	= =E21/E22 G11	− Prf. Charge to Com. Eq. = =G11 H12
E22 =E19 Average Common Equity F22			= Net Return on Common Equity =H11-H12 H13
E23 =E19 Average Common Equity F23	Common Book Value	= =E23/E24 G12	x Common Book Value = =G12 H14
E24 # Avg. # Common Shares F24			Previous Year's EPS =H13*H14 H15

Exhibit 6—Part 3

*The Effect of a Ratio's
Latest Year Value
on the Previous Year's EPS*

Total Revenue

| 100.000% | J1 |

−

Avg. Interest Rate

| =G1 | I1 |

x

% Revenue Consumed
by Interest Expense

| = | =I1*I2 | J2 |

Yrs. of Revenue to
Cover Liabilities

| =(100% −I9 −I10)/I8 | I2 |

−

Loan Loss Provision Rate

| =G3 | I3 |

x

% Revenue Consumed
by Loan Loss Provision

| = | =I3*I4 | J3 |

% Revenue from
Interest

| =G4 | I4 |

−

Efficiency Ratio

| =G5 | I5 |

x

% Revenue
Consumed by
Non-interest Expense

| = | =I5*I6 | J4 |

% Revenue After
Interest Expense

| =100% −J2 | I6 |

=

Operating Margin

| =J1 −J2 −J3 −J4 | J5 |

−

Tax Rate

| =G7 | I7 |

% Rev. Consumed by Tax

| > | =J5*I7 | J6 |

=

Profit Margin

| =J5 −J6 | J7 |

x

Asset Turnover

| =G8 | I8 |

Asset Turnover

| = | =I8 | J8 |

=

Preferred Equity Ratio

| =G9 | I9 |

Return on Assets

| =J7*J8 | J9 |

/

Common Equity Ratio

| =G10 | I10 |

Common Equity Ratio

| = | =I10 | J10 |

=

Return on Common Equity

| =J9/J10 | J11 |

−

Prf. Charge to Com. Eq.

| =G11 | I11 |

Prf. Charge to Com. Eq.

| = | =G11 | J11 |

=

Net Return on Common Equity

| =J11 −J12 | J12 |

x

Common Book Value

| =G12 | I12 |

Common Book Value

| = | =I12 | J13 |

=

Adjusted EPS

| =J12*J13 | J14 |

−

Previous Year's EPS

| =H15 | J15 |

=

$ Effect of Adjustment

| =J14 −J15 | J16 |

III. Determining a Ratio's Capacity to Improve Future EPS

The EPS Effect of a Ratio's 1% Improvement
    It is important to understand each ratio's capacity to improve future EPS. Exhibit 7 shows the EPS impact of a 1% improvement over our example bank's latest year ratio values. When a lower value is better, the improved value is 99% of the original; when a higher value is better, the improved value is 101% of the original.

        RATIO 1: INTEREST EXPENSE ÷ AVERAGE LIABILITIES
            A 1% decrease in the average interest rate paid on average liabilities would add about 5 cents to EPS.
        RATIO 2: PROVISION FOR LOAN LOSSES ÷ INTEREST INCOME
            A 1% decrease in the loan loss provision rate would add about 6/10 of a cent to EPS.
        RATIO 3: INTEREST INCOME ÷ TOTAL REVENUE
            Since non-interest income avoids the loan loss provision expense that burdens interest income, non-interest income typically has a higher profit margin. A 1% increase in the proportion of total revenue coming from non-interest income would add just about 2/10 of a cent to EPS. This assumes that the dollar amount of total revenue, the loss provision rate, and the tax rate stay constant.
        RATIO 4: NON-INTEREST EXPENSE ÷ TOTAL REVENUE LESS INTEREST EXPENSE
            A 1% decrease in the efficiency ratio would add almost 7 cents to EPS.
        RATIO 5: INCOME TAX ÷ PRETAX EARNINGS
            A 1% decrease in the effective tax rate would add about 1 and 4/10 cents per share.
        RATIO 6: TOTAL REVENUE ÷ AVERAGE ASSETS
            A 1% increase in the rate of asset turnover would add about 9 and 3/4 cents to EPS. This assumes that the dollar amount of non-interest expense remains constant.
        RATIO 7: AVERAGE COMMON EQUITY ÷ AVERAGE ASSETS
            The ratio of average common equity to average assets can be variously adjusted, both alone and in conjunction with the book value, to compare the EPS effects of alternative capital structures.
            •   A 1% increase in dollar liabilities while dollar common and preferred equity are unchanged would add about 2 and 1/2 cents to EPS.
            •   A 1% increase in dollar common equity while dollar preferred equity and dollar liabilities are unchanged would add about 3/10 of a cent to EPS.
            •   A 1% increase in dollar common equity replacing an equal dollar amount of liabilities would add about 1/10 of a cent to EPS.
            •   A 1% increase in dollar assets consisting solely of an increase in liabilities would add about 2 and 3/4 cents to EPS.
        RATIO 8: PREFERRED CHARGES ÷ AVERAGE COMMON EQUITY
            A 1% decrease in the ratio of preferred charges to common equity would add about 1/10 of a cent to EPS.
        RATIO 9: AVERAGE COMMON EQUITY ÷ AVERAGE COMMON SHARES OUTSTANDING. Adjustments to book value alone can also provide useful information.
            •   A 1% increase in dollar assets while the preferred and common equity ratios are unchanged would add about 2 and 3/4 cents to EPS.
            •   A 1% decrease in the number of common shares outstanding would likewise add about 2 and 3/4 cents to EPS.

    Comparing these figures we see that our bank's major earnings driver is asset turnover (about 9 and 3/4 cents per share), followed by its efficiency ratio (almost 7 cents per share), and then the average interest rate it pays on average liabilities (almost 5 cents per share). One percent improvements in these items would have the greatest positive effects on EPS. Next most important are the dollar amount of the assets and the number of common shares outstanding,

where the effects of various 1% improvement are approximately the same (slightly more than 2 and 3/4 cents per share).

Had we started from different ratio values, the relative influence of the nine critical ratios on EPS improvement would likewise have been different.

Exhibit 7—$ Effect on EPS of a 1% Improvement in a Critical Ratio

RATIO	$ EFFECT OF 1% IMPROVEMENT	RANK	ORIGINAL VALUE	IMPROVEMENT FACTOR	IMPROVED VALUE
INCOME STATEMENT ADJUSTMENTS					
Average Interest Rate on Average Liabilities	$0.04959	3	Interest Rate 3.973% Interest Expense $2,448	Do not adjust interest rate directly; instead, adjust $ interest expense. x .99 =	Interest Rate 3.933% Interest Expense $2,424
Loan Loss Provision to Loans	$0.00633	9	5.464%	x .99 =	5.409%
Interest Revenue to Total Revenue	$0.00206	11	75.403%	[(75.403% x 1.01)-.01] =	75.157%
Efficiency Ratio	$0.06886	2	66.204%	x .99 =	65.542%
Tax Rate	$0.01407	8	32.809%	x .99 =	32.480%
Asset Turnover (With Original Noninterest Expense Unchanged)	$0.09768	1	Asset Turnover 11.444% & Noninterest Revenue Consumption 44.829%	x 1.01 = / 1.01 =	Asset Turnover 11.559% & Noninterest Revenue Consumption 44.386%
BALANCE SHEET ADJUSTMENTS					
1% Increase in $ Liabilities ($ Equity Unchanged)	$0.02563	7	Preferred Equity Ratio 0.530% & Common Equity Ratio 6.471%	/ { [1.01 x (1 −Prf.Eq.Ratio −Com.Eq.Ratio)] + Prf.Eq.Ratio + Com.Eq.Ratio } / { [1.01 x (1 −Prf.Eq.Ratio −Com.Eq.Ratio)] + Prf.Eq.Ratio + Com.Eq.Ratio }	Preferred Equity Ratio 0.525% & Equity Ratio 6.411%
1% Increase in $ Common Equity ($ Preferred Equity & $ Liabilities Unchanged)	$0.00295	10	Preferred Equity Ratio 0.530% & Common Equity Ratio 6.471% & Prf.Chrg.to Com.Eq. 0.961% & Book Value $12.92515	/ [1 + (Com.Equity Ratio x .01)] = x {1.01 / [1 + (Com.Equity Ratio x .01)]} = / 1.01 = x 1.01 =	Preferred Equity Ratio 0.529% & Common Equity Ratio 6.531% & Prf.Chrg.to Com.Eq. 0.952% & Book Value $13.05440
1% Increase in $ Common Equity (Replacing an Equal Amount of $ Liabilities)	$0.00116	12	Common Equity Ratio 6.471% & Preferred Charge to Common Equity 0.961% & Book Value $12.92515	x 1.01 = / 1.01 = x 1.01 =	Common Equity Ratio 6.535% & Preferred Charge to Common Equity 0.952% & Book Value $13.05440
1% Increase in $ Assets ($ Liabilities Increasing, $ Equity Unchanged)	$0.02756	6	Preferred Equity Ratio 0.530% & Common Equity Ratio 6.471%	/ 1.01 = / 1.01 =	Preferred Equity Ratio 0.525% & Common Equity Ratio 6.407%
1% Increase in $ Assets (Total Equity Ratio & Prf. Chrg as% Com.Eq.Unchanged)	$0.02758	5	Book Value $12.92515	x 1.01 =	Book Value $13.05440
1% Reduction in # of Common Shares Outstanding ($ Total Equity Unchanged)	$0.02786	4	Book Value $12.92515	/ .99 =	Book Value $13.05570

Setting Up a Spreadsheet to Evaluate 1% Improvements

To calculate the EPS effect of a ratio's 1% improvement, we use Exhibit 8. Exhibit 8 is an expanded version of Exhibit 6, Part 1; two additional columns, E and F, are added.

COLUMN E

Column E will be used to make 1% improvements in the values of Column C.

- Initially, all of Column E's cells except E2 and E6 are set equal to the corresponding cells of Column C. For example, Cell E1 reads = *C1*.
- Cell E2 is set equal to *[100% - E9 - E10)] ÷ E8*.

- Cell E6 is set equal to *[100% - F2]*. (The formulas in E2 and E6 correspond to those entered earlier in Exhibit 6, Part 3 cells I2 and I6. Refer back to Section II for an explanation.)

COLUMN F
Column F is similar to Column D. Cells F1 through F15 bear the same relationship to the cells of Column E as the corresponding cells of Column D bear to the cells of Column C.
Cell F15 is re-labeled *Improved EPS*.

A new cell, F16, is added. It contains the *Latest Year's EPS* (which we enter by hand).
Another new cell, F17, is added and set to equal F15 minus F16. This cell shows the EPS increase when a value is improved.

Exhibit 8—Projection of Future Earnings

Column A	Column B	Column C	Column D	Column E	Column F
Latest Year Annual Report Amounts (in millions)	Categories	Values of Critical Ratios for the Latest Year	Latest Year's EPS Calculation	Latest Year Ratios Improved by 1%	EPS Effect of 1% Improvements

Calculating the EPS Effect of a Critical Ratio's 1% Improvement

To determine the EPS effect of a 1% improvement in a particular ratio, we adjust the current value of one of its associated cells, usually multiplying or dividing that cell's value by an improvement factor, as shown in Exhibit 7. Before moving on to another ratio, we always restore the adjusted cell to its original value.

In most cases we use Column E to adjust a ratio *directly*. We set the ratio's cell in Column E equal to the combination of: (1) its corresponding cell in Column C and (2) the mathematical operation that will produce a 1% improvement. However in the first instance below, the average interest rate, we must adjust the ratio *indirectly*, operating on a dollar value in Column A that feeds into it.

AVERAGE INTEREST RATE PAID ON AVERAGE LIABILITIES
Adjust the average interest rate indirectly. In cell A1 multiply the original *dollar interest expense* times the factor *.99*. We make the adjustment in this cell because a change in interest expense alters not only the average interest rate (C1 and E1), but also the efficiency ratio (C5 and E5). (Directly adjusting the average interest rate at E1 would leave the efficiency ratio unchanged, thus understating the EPS improvement.) After you have noted the improvement's effect on EPS (cell F16), return A1 to its original value.

LOAN LOSS PROVISION RATE
Adjust the loan loss provision rate in cell E3, making it equal to C3 times .99. Note the improvement in F16, then reset E3 to equal C3.

NON-INTEREST INCOME AS A PERCENT OF TOTAL REVENUE
As previously explained, the profit margin is normally higher on non-interest income than on interest income. An increase in the percent of non-interest income means a complementary decrease in the percent of interest income. The earnings equation uses the ratio of interest income to total revenue, so to show a 1% increase in non-interest income we must reduce the percentage of interest income by a complementary amount. Set E4 equal to C4 times 1.01 and from that product subtract .01, that is, $E4 = [(C4 * 1.01) - .01]$. Note the improvement in F16, then reset E4 to equal C4.

EFFICIENCY RATIO
Adjust the efficiency ratio in cell E5, setting it equal to C5 times .99. Note the improvement in F16, then reset E5 to equal C5. This adjustment gives the EPS effect of a 1% reduction in non-interest expense. (A reduction in non-interest expense changes the efficiency ratio's numerator, whereas a reduction in interest expense—made when we were considering the average interest rate—changes the efficiency ratio's denominator.)

TAX RATE
Adjust the tax rate in cell E7, setting it equal to C7 times .99. Note the improvement in F16, then reset E7 equal to C7. (Up to this point, the tax rate has been unaffected by ratio improvements: its denominator, pretax earnings, was entered by hand from the Income Statement—making it immune to previous adjustments in expenses—and its numerator, dollar taxes paid, has not been altered.)

ASSET TURNOVER
The EPS effect of an improvement in asset turnover can't be determined without adjusting two ratios at once. (This is also true for certain equity ratio and book value improvements.) To adjust the asset turnover rate, perform the following steps:
• Set F4 (adjusted non-interest revenue consumption) equal to D4 (original non-interest revenue consumption) divided by 1.01. This operation holds dollar non-interest expense constant.
• Set cell F8 (adjusted asset turnover) equal to C8 (original asset turnover rate) times 1.01.

- Record the EPS increase and then return F4 and E8 to their original values.

EQUITY RATIO

These adjustments allow us to examine the EPS effect of various changes in the relationship of equity, debt, and assets.

—The EPS effect of a 1% increase in dollar liabilities while dollar preferred equity and dollar common equity are unchanged can be found by simultaneously setting cells E9 (preferred equity ratio) and E10 (common equity ratio) equal to the following values.
- $E9 = C9 \div \{[1.01 * (1 - C9 - C10)] + C9 + C10\}$
- $E10 = C10 \div \{[1.01 * (1 - C9 - C10)] + C9 + C10\}$

—The EPS effect of a 1% increase in dollar common equity while the dollar amounts of preferred equity, the preferred equity charge, and dollar debt are unchanged is found by simultaneously adjusting the equity ratios and the book value.
- Set E9 (preferred equity ratio) equal to $C9 \div [1 + (C10 * .01)]$.
- Set E10 (common equity ratio) equal to $[C10 * 1.01] \div [1 + (C10 * .01)]$.
- Set E11 (preferred charge to common equity) equal to $C11 \div 1.01$.
- Set E12 (book value) equal to $C12 * 1.01$.

—The EPS effect of a 1% increase in dollar common equity replacing an equal dollar amount of debt is found by simultaneously adjusting the common equity ratio and the book value.
- Set E10 (common equity ratio) equal to $C10 * 1.01$.
- Set E11 (preferred charge to common equity) equal to $C11 \div 1.01$.
- Set E12 (book value) equal to $C12 * 1.01$.

—The EPS effect of a 1% increase in assets through additional liabilities while the dollar amounts of preferred equity, common equity, and the preferred charge are unchanged is found by simultaneously adjusting the preferred and common equity ratios.
- Set E9 (preferred equity ratio) equal to $C9 \div 1.01$.
- Set E10 (common equity ratio) equal to $C10 \div 1.01$.

PREFERRED CHARGE TO COMMON EQUITY

The EPS effect of a 1% decrease in the preferred charge to common equity is found as follows.
- Set E11 equal to $C11 * .99$.

BOOK VALUE

—To determine the EPS effect of a 1% increase in dollar assets when all else is unchanged, multiply the original book value times the appropriate improvement factor.
- Set cell E12 equal to $C12 * 1.01$.

—To determine the EPS effect of a 1% decrease in the number of common shares outstanding, divide the original book value by the appropriate improvement factor.
- Set cell E12 equal to $C12 \div .99$.

IV. Projecting Future EPS

We made 1% improvements in each ratio's value in order to compare the ratios' dollar-and-cents effect on EPS. The resultant rankings can guide management in setting and prioritizing performance goals. Emphasis should be placed on improving those ratios whose 1% changes produced the greatest EPS increases.

Projecting EPS using the ratio method. Begin by determining target values for the critical ratios. This is simple except in the case of the efficiency ratio.

Finding the new efficiency ratio can be confusing because its value is not only a function of the non-interest expense but also of the asset turnover, the interest rate, and the total equity ratio. Use the following formula to calculate it.

New Efficiency Ratio =

$$\frac{[\text{improvement factor } * \text{ original \$ non-interest expense}] \div \text{ original \$ average assets}}{\text{new turnover } - [\text{new interest rate } * (1 - \text{ new total equity ratio})]}$$

Once you have determined target values for the critical ratios, use Exhibit 8 to project future earnings.

CRITICAL RATIOS
Enter the target values in the appropriate cells of Column E.
COMPENSATING RATIOS
Make sure that cell E2 is set equal to *[100% - E9 - E10)] ÷ E8*.
Make sure that cell E6 is set equal to *[100% - F2]*.
LATEST YEAR EPS
Enter the EPS for the latest year in cell F16.

The calculated EPS will appear in cell F15. The difference between it and the most recent EPS will appear in cell F17.

Projecting EPS using the dollar method. As an alternative to the ratio method, future EPS can be projected from dollar and share amounts. Use Exhibit 8 in a different way.

COLUMN A
Enter the target dollar and share numbers in the appropriate cells of Column A.
COLUMN C
Except for C7, the tax rate, all the cells of Column C should contain the division formulas indicated in Column B.
•   Treat C7 differently. The dollar tax amount (A13) is dependent on the tax rate (C7), not the other way around. So, enter the applicable tax rate by hand in cell C7, leaving blank both the tax cell (A13) and the pretax earnings cell (A14).

As before, the projected EPS will appear in cell F15, and the difference between the projected EPS and that of the most recently completed fiscal year will appear in cell F17.

The synergy of simultaneous improvements. The EPS increase from simultaneously-made improvements will exceed the sum of the EPS increases from independently-made improvements.

In Section III we found our example bank's major earnings drivers to be (in declining importance): the efficiency ratio, the average interest rate paid on total average liabilities, the asset turnover, the number of common shares outstanding, and dollar amount of assets (where the ratios for common equity, preferred equity, and preferred charge are unchanged).

Let us suppose that the bank's goal for the coming year is to achieve a 1% improvement in those five values while maintaining the current values of the loan loss provision rate, the interest income percentage, the tax rate, the equity ratios, and the preferred charge.

When the effects of these five improvements are calculated independently and summed, the result is an EPS increase of about 22 cents—a gain of just under 8%. But when the effects of these five improvements are calculated simultaneously, the EPS increase is almost 33 cents, a gain of nearly 12%.

That difference arises because one improvement magnifies the effect of another. Recall that the return on assets is the product of the profit margin times the asset turnover. Both the profit margin and the turnover rate have increased. So when these two improved ratios are multiplied together, each improvement enhances the other.

This synergy happens in other places as well. The combination of the two adjustments to book value—reflecting a simultaneous increase in dollar assets and decrease in common shares

outstanding—raises the book value more than the sum of their independently calculated outcomes.

Ultimately, the improvements in book value, profit margin, and asset turnover all magnify each other. Why? Because EPS equals the net return on common equity times the book value. And the net return on common equity embodies the improvements in the profit margin and the asset turnover.

V. Limits to Improvement

Where will EPS growth come from? There is a limit to the improvement that can be made in the value of most critical ratios.

The interest rate paid on average liabilities is significantly influenced by forces beyond the bank's control; the loss provision rate is unlikely to decline once credit quality has reached a consistently high level; the ratio of non-interest revenue to total revenue is constrained by the scarcity of some non-interest revenue opportunities and the risk of others; the efficiency ratio can be driven only so low; and strategies to reduce the effective tax rate must conform to the tax code.

Asset turnover is difficult to increase once non-interest-earning assets have been minimized, lower yielding instruments have been converted into higher yielding ones, and fees have been introduced and elevated to market limits. And because the equity component of total assets can't drop below a percentage mandated by regulators and lenders, a bank cannot indefinitely improve its earnings by increasing its leverage.

As the above ratios stabilize, whether at ideal or less-than-ideal values, so does the net return on common equity. EPS is the product of the net return on common equity times the book value; so, once the net return on common equity has stabilized, EPS growth can only come from an improvement in book value. Faced with these circumstances, a bank must increase its dollar equity, reduce its common shares outstanding, or both. Otherwise, its EPS will stagnate.

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